

Mount Diablo Astronomical Society

Diablo Moon Watch

May 2014

GENERAL MEETING

Tuesday May 27, 2014

How to Search for Invisible Particles

(towards direct detection of dark matter)

by Dr. Peter Sorensen

**Doors open at 6:45 p.m.
Lindsay Wildlife Museum
1931 First Avenue,
Walnut Creek, CA 94597**

**Please park East of the
museum, follow the
instructions on the last page**

Dr. Sorensen will describe the experimental challenges involved in seeking to directly detect the hypothetical dark matter particles which comprise about 25% of the mass density of the universe. He will present recent results from LUX and



superCDMS, as well as hints of signal in several other experiments (and the ensuing controversy and intrigue).

Peter received his PhD in physics from Brown University in 2008. From 2004-2008 his research took him from Providence to New York to Italy and back, in the process of design-

ing, building, deploying and analyzing data from an early dark matter detector called XENON10. In 2008 Peter took a job as a post-doc at LLNL, where he continued his research on dark matter direct detection, now working on the much larger LUX experiment. Since 2011 he has been a Staff Scientist at LLNL, where he works on rare neutral particle detection (including dark matter).

Swarm's Precise Sense of Magnetism. *by The European Space Agency*

Although they were launched only five months ago, ESA's trio of Swarm satellites are already delivering results with a precision that took earlier missions 10 years to achieve.

Engineers have spent the last five months commissioning the identical satellites and carefully guiding them into their orbits to provide the crucial measurements that will unravel the mysteries of Earth's magnetic field.

Swarm has a challenging task ahead.

Together, the satellites will measure and untangle the different magnetic readings that stem from Earth's core, mantle, crust, oceans, ionosphere and magnetosphere.

In addition, information will also be provided to calculate the electric field near each satellite - an important counterpart to the magnetic field for studying the upper atmosphere.

Two satellites are now orbiting almost side by side and have started their operational life at 462 km altitude. The third is higher, at 510 km.

(Continued on page 4)

WHAT'S UP

The History of Eclipse Prediction

by Ken Coates

When did people first understand eclipse cycles? Why is it easier to predict lunar eclipses for a particular location? Who was the first person to predict when and more importantly "where" a solar eclipse would happen? What knowledge was required to figure that out? What is the most famous eclipse prediction in history.

PRESIDENT'S CORNER

This Month's Club News and Commentary

by Jim Head

Thank you for opening this issue of the Diablo Moonwatch. First up is a short news story, then a first peek at the new Night Sky Network website, and an update on our activities.

26 Large Asteroid Impacts Detected since 2000

From SSERVI

"Between 2000 and 2013, a network of sensors that monitors Earth around the clock listening for the infrasound signature of nuclear detonations detected 26 explosions on Earth ranging in energy from 1-600 kilotons - all caused not by nuclear explosions, but rather by asteroid impacts.

These findings were recently released from the Nuclear Test Ban Treaty Organization, which operates the network.

To put this data in perspective, the atomic bomb that destroyed Hiroshima in 1945 exploded with an energy impact of 15 kilotons. While most of these asteroids exploded too high in the atmosphere to do serious damage on the ground, the evidence is important in estimating the frequency of a potential "city-killer-size" asteroid."

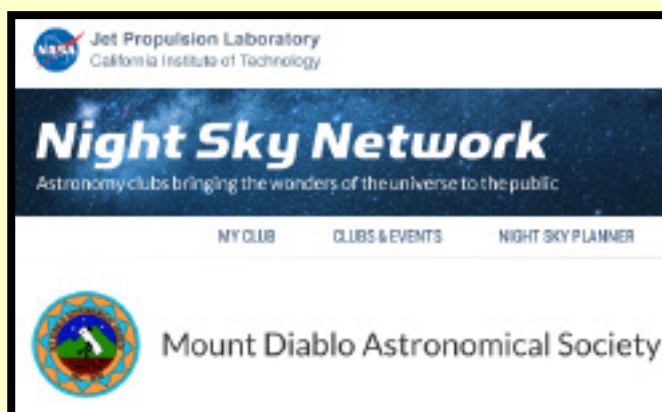
For more information please visit

<http://sservi.nasa.gov/articles/powerful-asteroids-strike-earth-with-surprising-frequency-video/>

New Night Sky Network Website Interface

The Night Sky Network website has changed, most of the functionality remains the same, the appearance has been updated to improve the experience when using mobile devices, for example, it's now easier to log your hours with a link in the list/calendar view, and the list view is combined with the monthly calendar view. A few issues remain, primarily for the coordinators - the spell checker is missing,

copy/paste is not consistent and awkward, location lists can't be sorted, and group messages are



sent out as if they were a personal message, with no mention that it's a group message or what group it came from. Some users had difficulty finding the Calendar or trouble loading events, and the functionality to include multiple events in one email was removed. Hopefully, most of these problems will be corrected in future versions, the solutions are straightforward. There's much more behind the Night Sky Network user experience, the hardworking folks at the Astronomical Society of the Pacific are doing a great job coordinating new activities and running the nationwide program. The NSN website has helped coordinate the functions of our club and connects hundreds of astronomy groups in the USA. Organizing outreach events and our membership would be much more difficult and time consuming without it, thanks go to those who worked hard to provide these tools. Take some time to familiarize yourself with the new layout, it's does a

(Continued on page 3)



This Month's Club News and Commentary *(Continued from the previous page)*

great job coordinating many functions.

Lucky Weather!

Well, almost. Unfortunately we had to cancel the last Public Night, but were lucky with other events. We worked our way around the clouds for the two-day solar activities at the State Park's Birthday Celebration – I heard the cake was good too. The new picnic area seems to be working well for the public. The weather forecast wasn't looking favorable for the event at Fernandez Ranch, when we arrived the clouds were not an issue, later in the evening the seeing was very good, there were many visitors, quite a few



enjoyed the ice cream.. Our event at Cambridge Elementary went well, earlier in the day the weather suggested zero transparency but the sky opened just enough to get Jupiter, Mars and the Moon for the students. We hope our luck continues!

New events added to our Calendar:

Our Sun has been providing a good show despite being one of the weakest maximums in many decades. Once in awhile solar activity kicks up, today there was a M5-

class solar flare detected. In an attempt to show the public what's left of this cycle, and because it's enjoyable to just admire the view, we've added a number of events – 2 solar events

at the Lindsay Museum–Larkey Park, both are on Sundays, June 15th and August 24th, solar observing at the San Pablo Library on Monday May 19th, and then at the Hercules Library Saturday July 19th. October 23rd is a partial eclipse of the sun, we're going through the list of possible sites for the Thursday afternoon event.

We also added an evening program for the general public at the Lindsay Museum on Wednesday July 30th.

By the way, the next Society Night is May 24th, and Public Night May 31. Long term forecasts suggest cloudy skies, let's hope not!

Hope you enjoy this issue of the Diablo Moonwatch

Jim Head

Outreach Program at Fernandez Ranch



Marni Berendsen explaining the phases of the moon. --Photo taken by Mike Harms.

Swarm's Precise Sense of Magnetism. *(Continued from page 1)*

Swarm: a new constellation in the sky

The readings made at different locations will be used to distinguish between the changes in the magnetic field caused by the Sun's activity and those signals that originate from inside Earth.

Swarm is now in its fine-tuning phase but it has already produced enough information to build models of the magnetic field for comparison with existing models.

This proves that only a few months of Swarm data agree very well with a decade or more of predecessor missions.

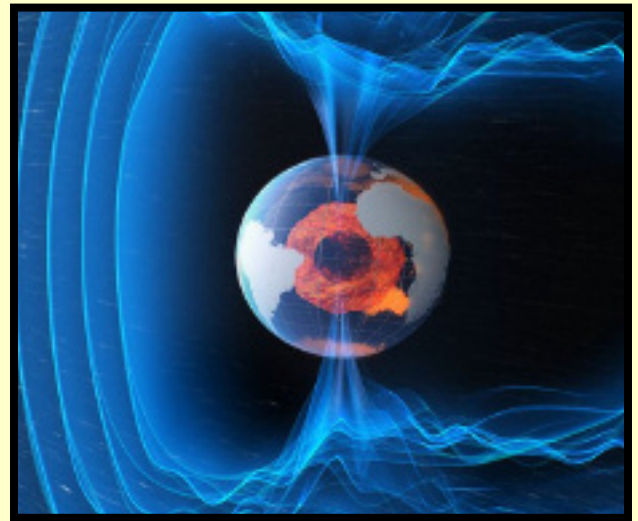
For example, the image above shows the differences between Swarm's version of the magnetic field from Earth's crust compared to the 'Chaos-4' model. There are very few differences, demonstrat-

ing that the mission is working well.

ESA's mission manager, Rune Floberghagen, said, "Although it has certainly been a big job getting the three satellites ready for operations, we are all very happy with how well the mission is doing so soon after launch.

"Scientists will start to have access to the mission's magnetic field data in a couple of weeks."

Over the coming years, this innovative mission will provide new insight into many natural processes, from those occurring deep inside the planet to weather in space caused by solar activity.

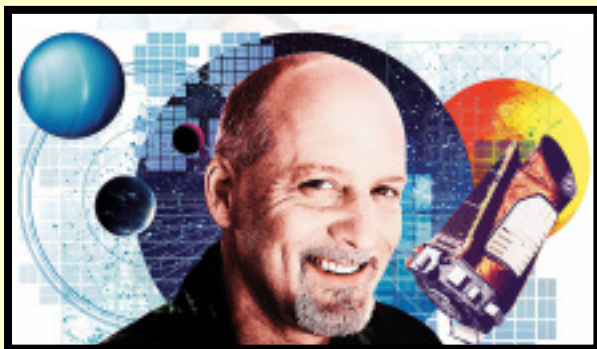


Earth's magnetic field

In turn, this information will yield a better understanding of why the magnetic field is weakening.

The first results and status of the mission will be presented at a Swarm science meeting on 19-20 June in Denmark.

Finder of New Worlds: Geoffrey Marcy in The New York Times



Of course a very interesting and worth reading article on Geoffrey Marcy and his search for exoplanets, superb exposé with a historic timeline:

<http://www.nytimes.com/2014/05/13/science/finder-of-new-worlds.html?ref=science&r=0>

He spoke to us on at least two occasions!

The Hottest Planet in the Solar System

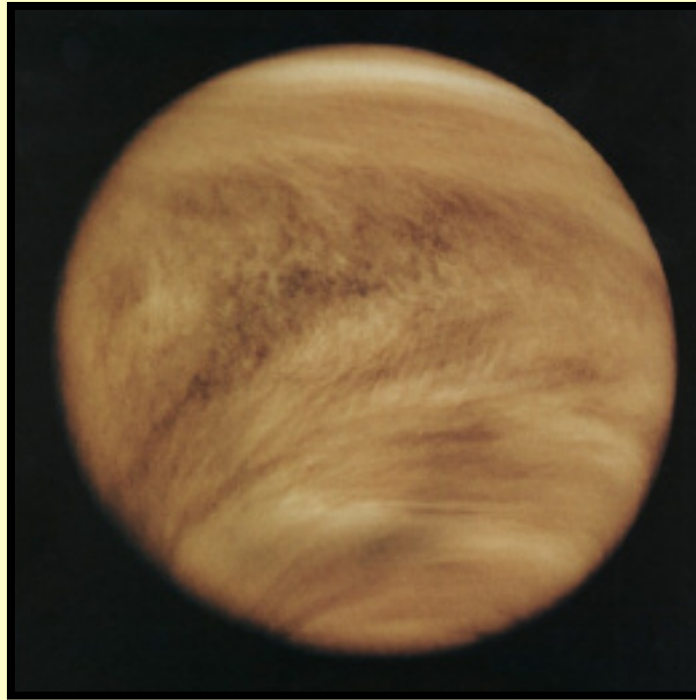
By Dr. Ethan Siegel

When you think about the four rocky planets in our Solar System—Mercury, Venus, Earth and Mars—you probably think about them in that exact order: sorted by their distance from the Sun.

It wouldn't surprise you all that much to learn that the surface of Mercury reaches daytime temperatures of up to 800 °F (430 °C), while the surface of Mars never gets hotter than 70 °F (20 °C) during summer at the equator. On both of these worlds, however, temperatures plummet rapidly during the night; Mercury reaches lows of -280 °F (-173 °C) while Mars, despite having a day comparable to Earth's in length, will have a summer's night at the equator freeze to temperatures of -100 °F (-73 °C).

Those temperature extremes from day-to-night don't happen so severely here on Earth, thanks to our atmosphere that's some 140 times thicker than that of Mars. Our average surface temperature is 57 °F (14 °C), and day-to-night temperature swings are only tens of degrees. But if our world were completely airless, like Mercury, we'd have day-to-night temperature swings that were hundreds of

degrees. Additionally, our average surface temperature would be significantly colder, at around 0 °F (-18 °C), as our atmosphere functions like a blanket: trapping a portion of the heat radiated by our planet and making the entire atmosphere more uniform in temperature.



NASA's Pioneer Venus Orbiter image of Venus's upper-atmosphere clouds as seen in the ultraviolet, 1979.

But it's the second planet from the Sun – Venus – that puts the rest of the rocky planets' atmospheres to shame. With an atmosphere 93 times as thick as Earth's, made up almost entirely of carbon dioxide, Venus is the ultimate planetary greenhouse, letting sunlight in but hanging onto

that heat with incredible effectiveness. Despite being nearly twice as far away from the Sun as Mercury, and hence only receiving 29% the sunlight-per-unit-area, the surface of Venus is a toasty 864 °F (462 °C), with no difference between day-and-night temperatures! Even though Venus takes hundreds of Earth days to

rotate, its winds circumnavigate the entire planet every four days (with speeds of 220 mph / 360 kph), making day-and-night temperature differences irrelevant.

Catch the hottest planet in our Solar System all spring-and-summer long in the pre-dawn skies, as it waxes towards its full phase, moving away from the Earth and towards the opposite side of the Sun, which it will finally slip behind in November. A little atmospheric greenhouse effect seems to be exactly what we need here on Earth, but as much as Venus? No thanks!

Mount Diablo Astronomical Society Event Calendar–May 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	1	2	Society Observing 3 (Private) 8:30 PM Fernandez Ranch Starparty Sunset: 8:03 PM
4	5	Joaquin Moraga 6 Stargazing (Private)	8:00 PM 7 Cambridge Astronomy Night 	8	9	10 Sunset: 8:09 PM
11	Board Meeting 12 (Private)	13	14	MDAS Imaging 15 Meeting (Private)	16	Observatory 17 Maintenance (Private) 8:30 PM F. Ranch Starparty Backup Sunset: 8:16 PM
18	3:30 PM San 19 Pablo Library Solar	20	21	22	23	Society 24 Observing (Private) Sunset: 8:21 PM
25	Memorial Day 26	7:15 PM GenMtg: 27 LUX & Dark Matter	28	29	30	7:30 PM Public 31 Astronomy: Planets Sunset: 8:26 PM



**Lunar eclipse of April 15
taken by Mike Harms**

Mount Diablo Astronomical Society Event Calendar—June 2014

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
						1 sunset: 19:04
2	3	4	5 ☾	6 8:45 PM Walnut Across Stargazing	7	8 sunset: 19:00
9 8:30 PM Board Meeting (Private)	10	11	12 ●	13	14	15 1:00 PM Solar at the LWM sunset: 19:12
16	17	18	19 7:00 PM MDAS Imaging Meeting (Private)	20 ☾	21 8:00 PM Public Astronomy: Aliens	22 sunset: 19:14
23	24 7:15 PM GemMtg: Prof. Joel Palka	25 OSSP	26 OSSP	27 ● OSSP	28 OSSP 7:30 PM Society Observing (Private) 8:30 PM RHOD Composed (Private)	29 OSSP sunset: 19:15

Share your news with other members through the Diablo Moonwatch

We are always looking for new articles, images or photos and content. If you have astronomical perspectives or experiences to share with your fellow members that you would us to consider, please feel free to contact me Jim (jamesnhead@comcast.net) or our newsletter editor Vianney. (veloroute@hotmail.com)

Clear skies!

Jim and Vianney



Board Members & Address

President

Jim Head - jamesnhead@comcast.net

Vice President

Mike Harms - cmbarms2@gmail.com

Membership Coordinator, Mtg Room

Marni Berendsen - berendsen@aol.com

Meeting Program Chair

Dick Flasck - rflasck@aol.com

Outreach Coordinator, AANC Rep

Jim Head - jamesnhead@comcast.net

Publicity

Steve Jacobs - llasjacobs@astound.net

Observing Committee Chair, Board Member

Richard Ozer - rozer@pacbell.net

Whats Up Coordinator, Board Member

Kent Richardson - kayarind@sbcglobal.net

Treasurer

Will Roberge - wil@donabue.com

Newsletter Editor, Board Member

Vianney - veloroute@botmail.com

Webmaster

Jon Steel - jonlee0483@aol.com

Secretary

Moon - Moonglow6@hotmail.com

New Member Steward

Nick Tsakoyias - claytonjandl@aol.com

Mailing address:

MDAS

P.O. Box 4889

Walnut Creek, CA 94596-3754

General Meetings:

Fourth Tuesday every month, except on the third Tuesday in November and December.

Refreshments and conversations at 6:45 pm;

Meeting begins at 7:15

Where:

Lindsay Wildlife Museum

1931 1st Avenue

Walnut Creek, CA 94597

(925) 935-1978

wildlife-museum.org.

Directions to facility:

From the North: Take 680 South to Treat Blvd.

exit. Turn left at light onto North Main St. Turn

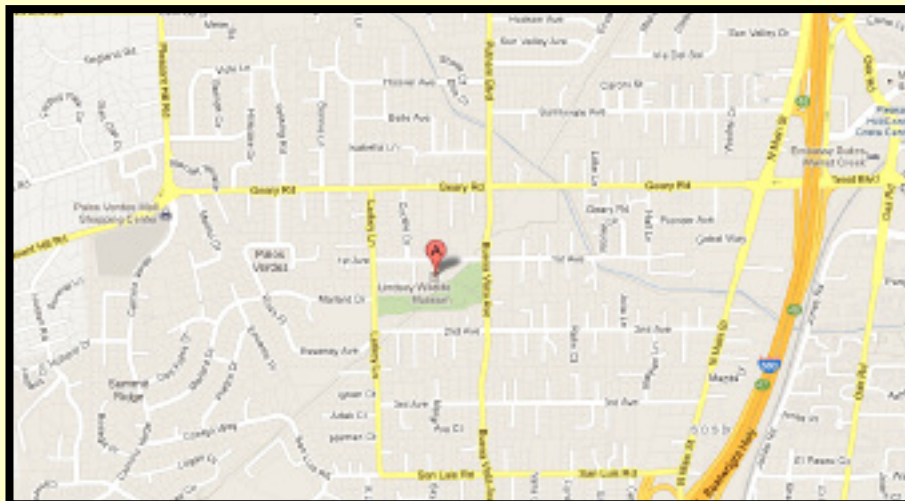
right on Geary Road. Turn left on Buena Vista.

Turn right on First Avenue. The museum is halfway up the block on the left.

From the South: Take 680 North. Take the Treat Blvd./Geary Road exit and turn left over free-way. Go three more lights and turn left on Buena Vista. Turn right on First Avenue. The museum is halfway up the block on the left.

Parking:

The museum is located in a residential area. There are no parking fees nor meters. Please park only in the museum parking lots on the east side of the museum, the Friends Church lot across the street (except Sunday mornings) or on Buena Vista Avenue. Please do not park on First Avenue in front of our neighbors' homes — you will get a parking ticket.



Outreach Programs at Elementary Schools



Ken De Silva demonstrating and sharing his telescope at Cambridge Elementary School
Photos by Mike Harms and Jim Head



Mike Harms explaining the sky at John Muir Elementary school.